



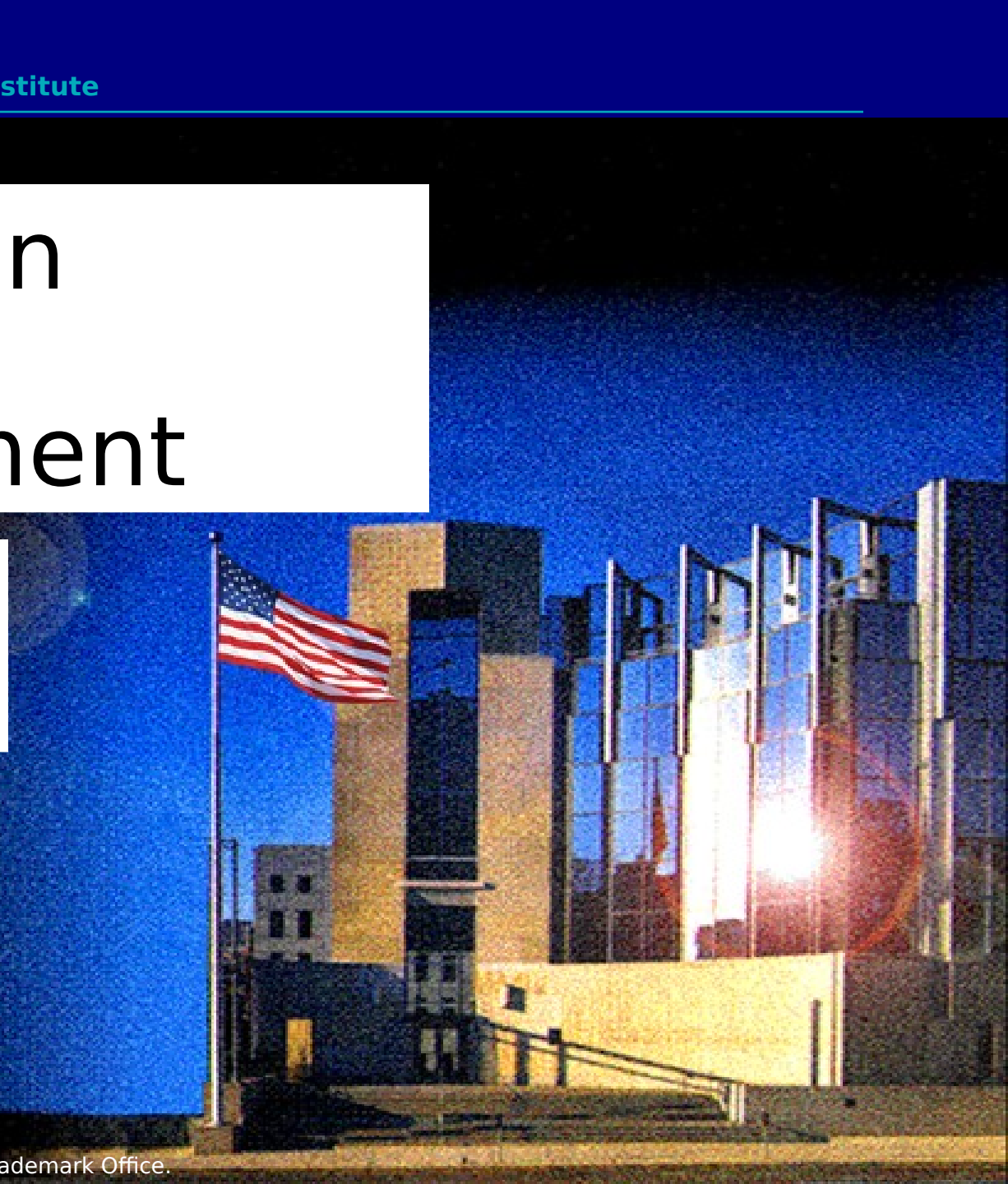
Acquisition Process Improvement

A DFAS Overview

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Software Engineering
Institute
Carnegie Mellon University
Pittsburgh, Pennsylvania

Sponsored by the
U.S. Department of





Agenda

- Objectives
- Why Acquisition Process Improvement is Important to DFAS
- Acquisition CMM Overview and Interrelationships
- Summary For DFAS Action



Objectives -1

This overview will enable you to

- understand the importance of improving acquisition work processes
- understand the rationale for acquisition process improvement
- comprehend the structure and interrelationship of the SA-CMM and SW-CMM



Objectives -2

You will also be able to

- understand the models sufficiently to read and study independently
- start identifying ways of applying the CMMs to achieve DFAS acquisition process improvement
- start building acquisition improvement based on DFAS success in software process improvement



Things to Think About

As we go through the overview keep in mind

- Does DFAS organization
 - **have an acquisition process it follows?**
 - **acquire any software products or services?**
 - **acquire software-intensive systems?**
 - **support other Government acquisition or development organizations?**
 - **have an software development process it follows?**
- Suggested ways to implement acquisition based improvement at the DFAS



Software is everywhere...

Software *is* the system.....

**Think
DFAS**

**Can the DFAS function
without software intensive
systems?**



Awakening to the Need -1

The dawning realization of the need for change can take many forms:

- signs of a decline, which everyone has a reason for, but which no one really understands
- high turn-over of talented staff
- the existence of new and exciting opportunities that seem just out of grasp — unless some new ways of thinking and doing business are implemented
- a pattern of projects that exceed cost, schedule or both (GAO reports)



Awakening to the Need - 2

The dawning realization of the need for change can take many forms:

- the unwillingness of certain customers to work with us unless we can demonstrate mature product development processes (outsourcing)
- the competition is eating our lunch (your job)
- our most important customer just terminated their relationship with us
- Congress will not provide funds - unless???



Is There A Modernization Crisis in DFAS?

GAO-What went wrong? DFAS- How could this happen?

Do Investigation findings show:

- “System complexity and XXX’s lack of experience in procuring major systems caused serious cost growth
- “XXX lacks system engineering and major program management expertise”
- “Absence of XXX requirements stabilization process”
- XXX Program management “does not enforce timely milestones, timelines, and deliverables”
- XXX Program management “...lack of process control made assessment of technical risk impossible”
- XXX Program management “...lack of short- and long-term budget tracking makes cost assessment nearly impossible”
- “Available, effective risk management tools not used”



A Serious and Costly Problem

US spends \$250 Billion/year on IT applications

Avg. cost:

Large Co.: \$2.32 M, Med. Co.: \$1.33 M, Small Co.: \$0.43 M

- ➡ 31 % of all projects fail - canceled prior to completion
- ➡ 52 % of projects overrun
- ➡ 189% of original estimates = average overrun
- ➡ 42 % of planned features actually delivered in large company applications

Only 16 % of software projects completed on-time, on-budget

Decreases to only 9% with larger companies/larger applications.

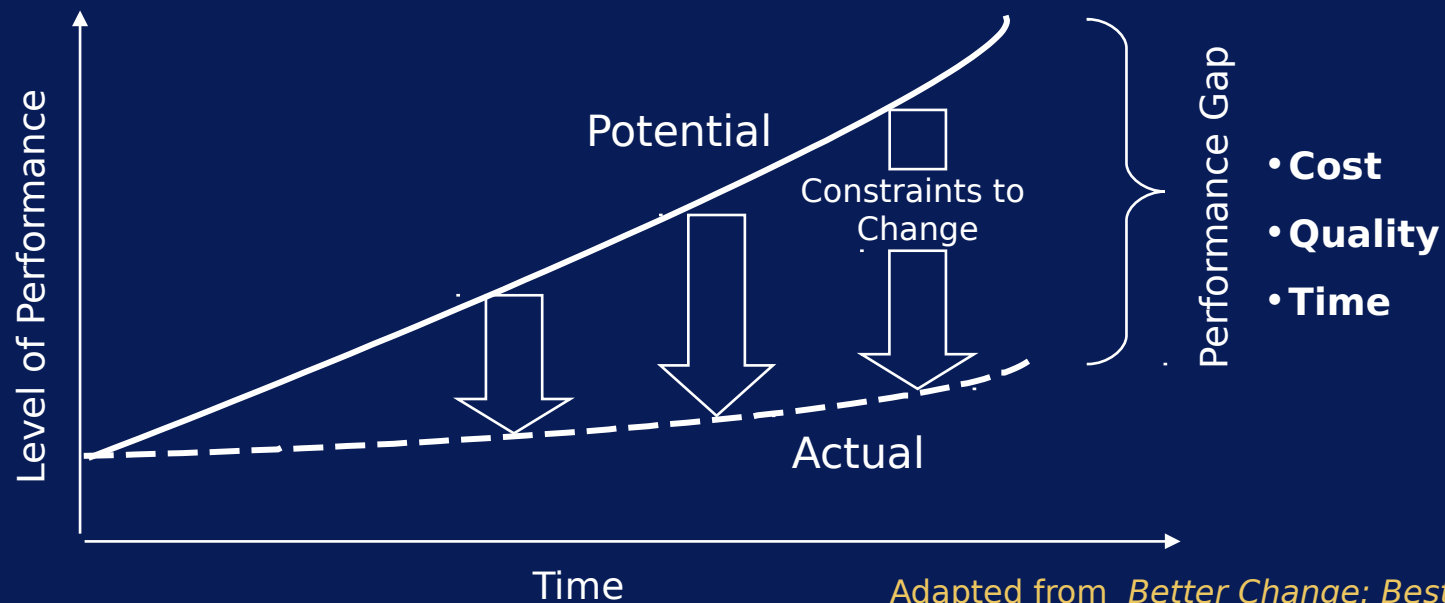
Standish Group CHAOS Study (1994):

Large, medium & small companies across major industry segments (e.g. banking, securities, mfg., retail, health care - federal, state, local govt.) 365 respondents, Over 8,000 IT applications



Why Change?

- High performance organizations are continually responding to changing customer needs and the changing competitive environment.
- They are removing the constraints to change by reengineering their processes in order to achieve their potential.



Adapted from *Better Change: Best Practices for Transforming Your Organization*, p. 2.



The State of the Practice

"I'd rather have it wrong than have it late."

- A senior software manager (industry)

"The bottom line is schedule. My promotions and raises are based on meeting schedule first and foremost."

- A program manager (government)

"By regularly putting the development process under extreme time pressure and then accepting poor-quality products, the software user community has shown its true quality standard."

- DeMarco and Lister (Peopleware, 1987)



Management of SW-intensive Systems Is A Dual Responsibility

Aquirer

Supplier



Ultimately, the responsibility lies with the Acquirer



Acquisition is Major DFAS Focus

DFAS has “out-sourced” some modernization

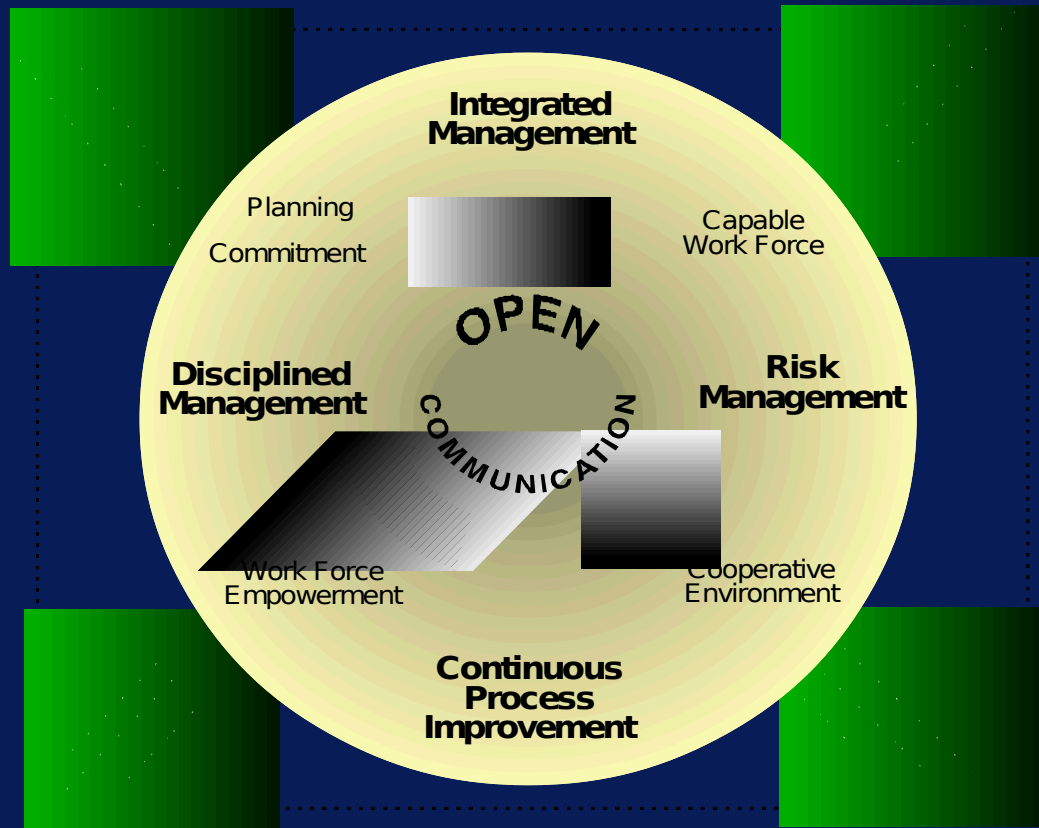
DFAS has “in-house” sourced some modernization

DFAS and the “out-sourced” and “in-house” suppliers must be successful to accomplish DFAS Mission

DFAS has ultimate responsibility for serving the United States



Software Acquisition Principles





Organization of Acquisition Principles

Core Principle

- undergirds all other principles
- universal in its application

Defining Principles

- define the vision of the organization
- sets the tone for the overall operational perspective

Sustaining Principles

- focus on how the organization goes about the daily business of acquisition



Software Acquisition Principles

Core Principle

- Open Communication

Defining Principles

- Shared program vision
- Forward-looking view
- global perspective
- creative environment

Sustaining Principles

- Planning
- Commitment
- Disciplined and Integrated management
- Risk Management
- Capable work force
- Cooperative environment
- Work force empowerment
- Continuous process improvement



What Can Be Done ?

Premise:

The quality of the product is governed largely by the process used to create the product

We could improve the process and practices of the developer

*But the developers have a head start
(SW-CMM-based improvement programs are widespread)*

We could improve the processes and practices of the Acquirer

*Increase the visibility of software in system acquisitions
by improving the software acquisition processes*



Buyer/Supplier Mis-match





CMM's For Process Improvement



Why Have an CMM? -1

The brief history of software development and software acquisition programs has been filled with problems.

- **cost overruns**
- **schedule slippage**
- **failure to achieve performance goals**

Systems are increasingly dependent on software, yet hardware typically gets the most visibility.



Why Have an SW-CMM? -2

The SW-CMM was developed to

- **increase awareness of the criticality of software developers delivering as promised**
- **provide a model of key features for the process of developing software products and services**



Why Have an SA-CMM? -3

The SA-CMM was developed to

- **increase awareness of the criticality of software in an acquisition**
- **increase awareness of the criticality of acquisition (buyer) process in quality of software development**
- **provide a model of key features for the process of acquiring software products and services**



Different CMM Users

SA-CMM

**organizations that
acquire or support
acquisition of
products that contain
software, including
software support and
maintenance**

**responsible for
acquisition life cycle
from requirements
development through
system delivery for
use and support**

SW-CMM

**organizations that
develop or
maintain products
that contain
software**

**may subcontract
part of job, but
responsible for
delivery of system**



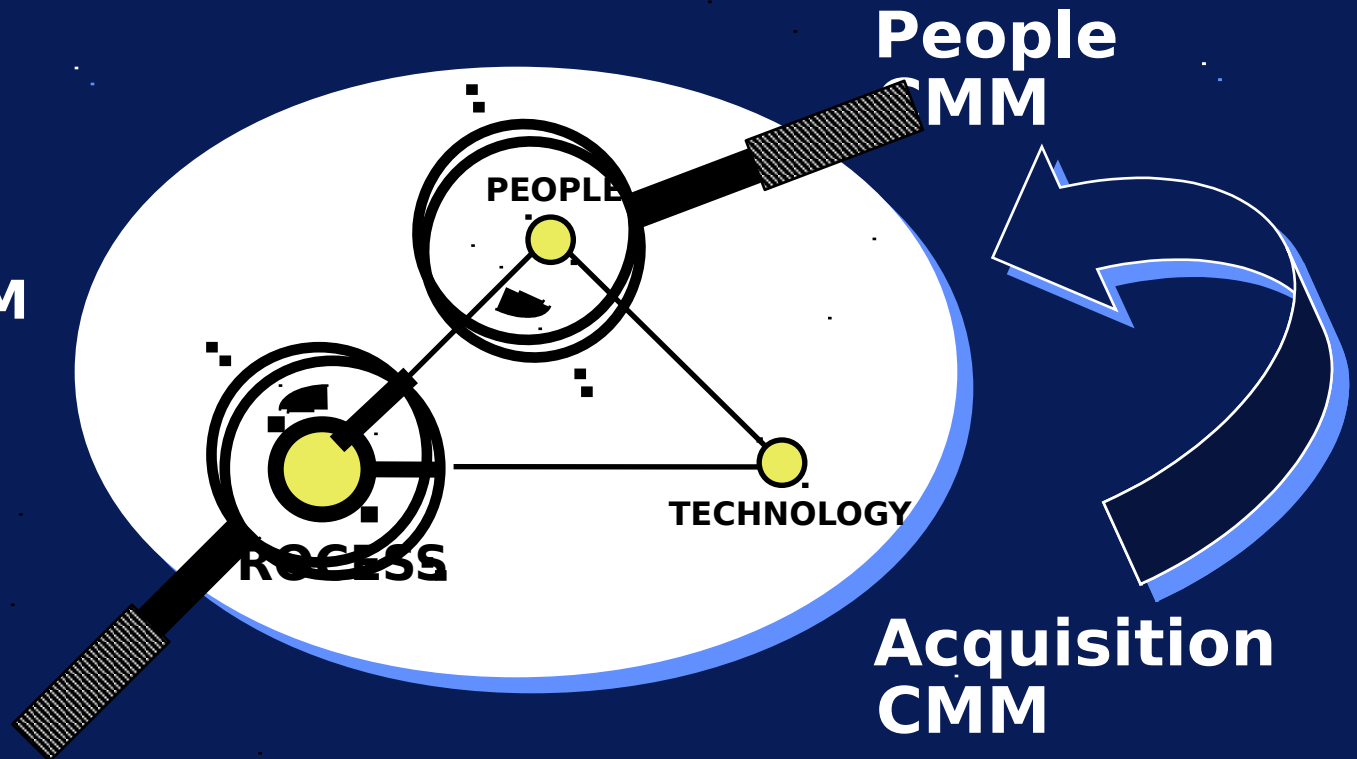
Different CMM Focus

Software CMM

**Systems
Engineering
CMM**

IPD CMM

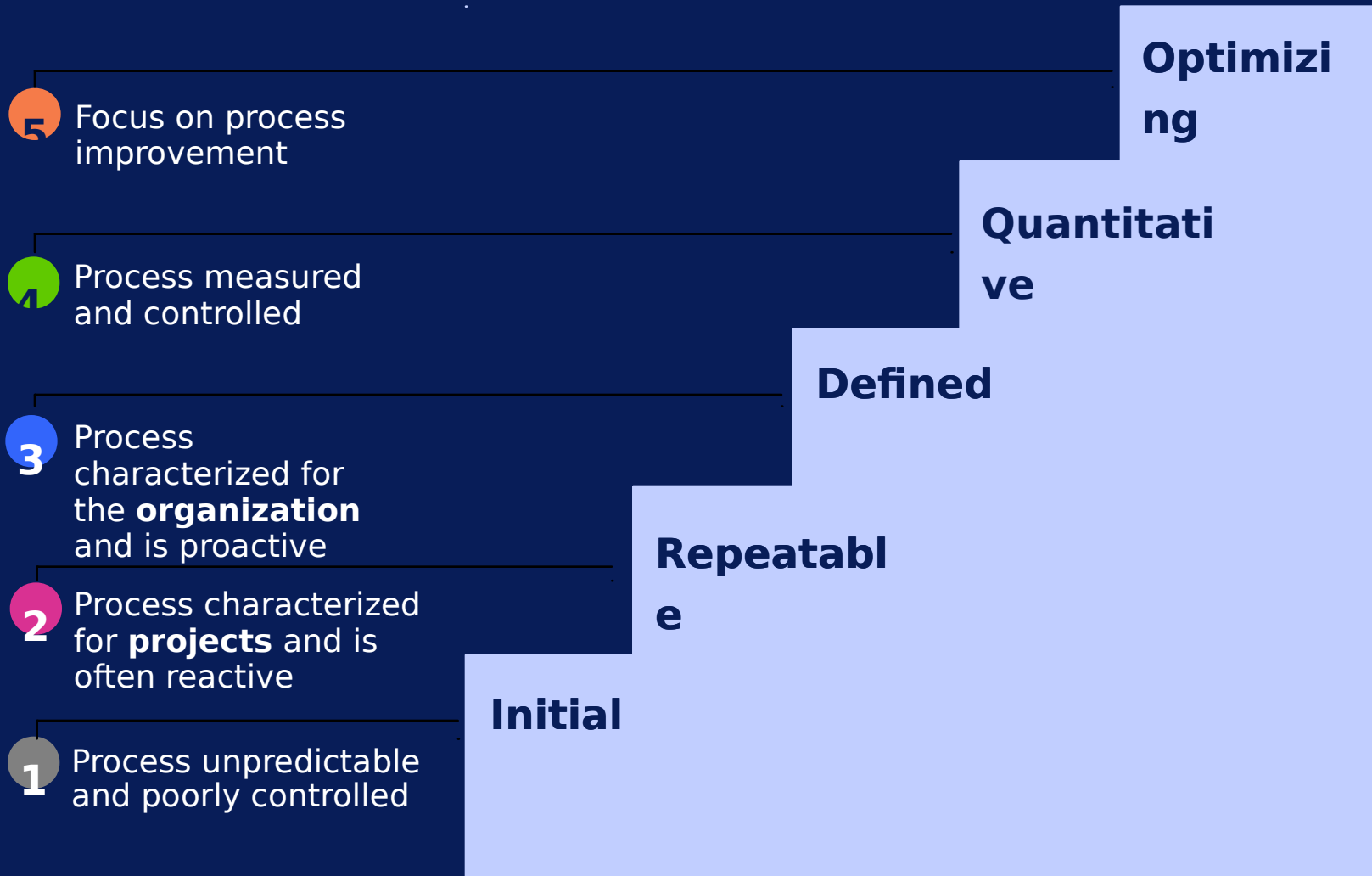
**CMM
Integration**



Remember: Experts estimate that 90% of product problems can be attributed to problems in the process.

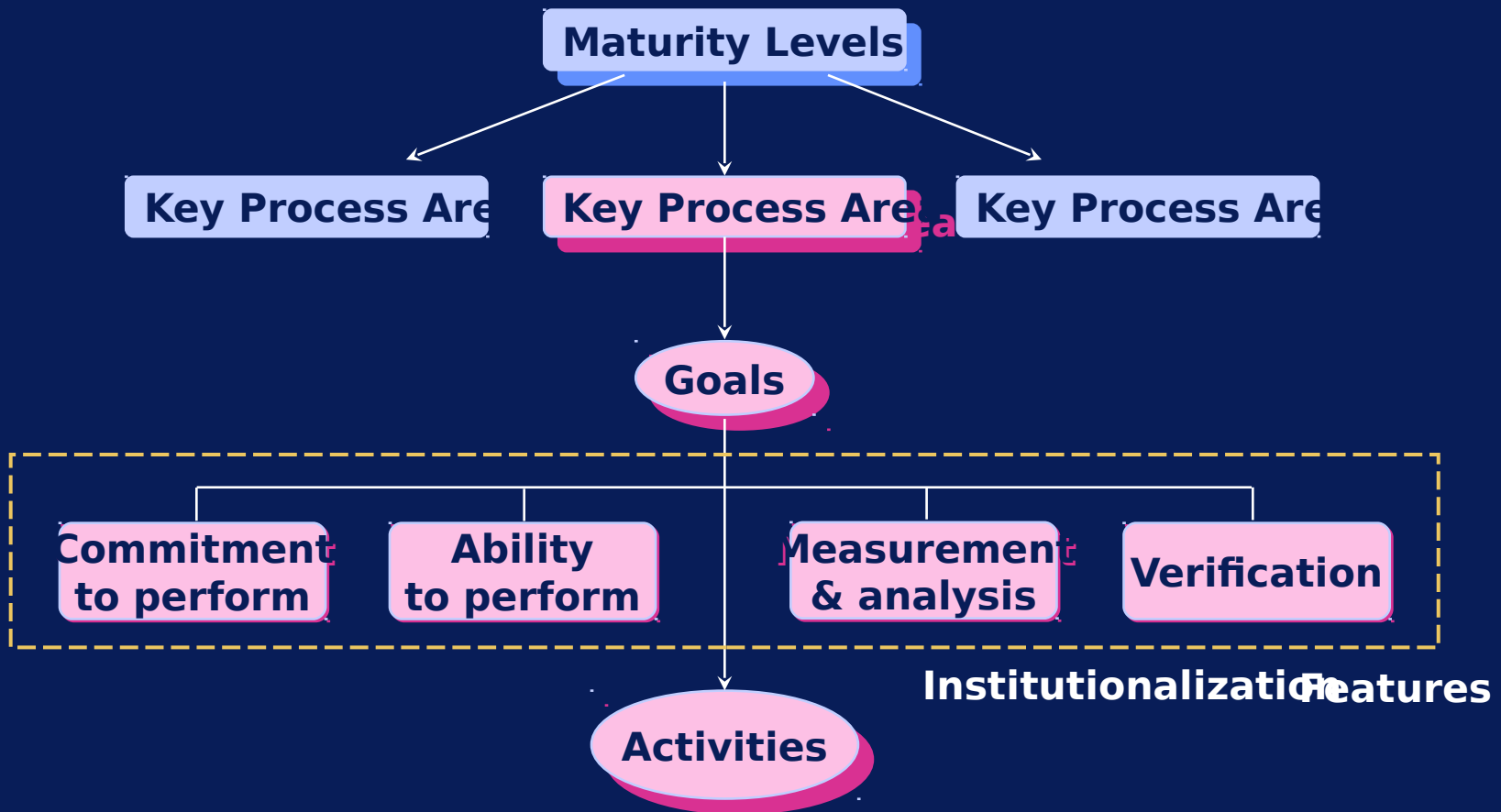


The Maturity Levels





CMM Structure





The SA-CMM[®]'s Key Process Areas

Level	Focus	Key Process Areas	
5 Optimizing	Continuous process improvement	Acquisition Innovation Management Continuous Process Improvement	Quality Productivity Lower Risk
4 Quantitative	Quantitative management	Quantitative Acquisition Management Quantitative Process Management	
3 Defined	Process standardization	Training Program Acquisition Risk Management Contract Performance Management Project Performance Management	
2 Repeatable	Basic project management	Process Definition and Maintenance Transition to Support Evaluation Contract Tracking and Oversight Project Management Requirements Development and Mgt Solicitation Software Acquisition Planning	
1 Initial	Competent people and heroics		Higher Risk Rework

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The SW-CMM®'s Key Process Areas

Level	Focus	Key Process Areas
5 Optimizing	<i>Continuous process improvement</i>	Defect Prevention Technology Change Management Process Change Management
4 Managed	<i>Product and process quality</i>	Quantitative Process Management Software Quality Management
3 Defined	<i>Engineering processes and organizational support</i>	Organization Process Focus Organization Process Definition Training Program Integrated Software Management Software Product Engineering Intergroup Coordination Peer Reviews
2 Repeatable	<i>Project management processes</i>	Requirements Management Software Project Planning Software Project Tracking & Oversight Software Subcontract Management Software Quality Assurance Software Configuration Management
1 Initial	<i>Competent people and heroics</i>	

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Key Process Areas for Level 2

2

Transition to Support
Evaluation

Project Management

Contract Tracking and
Oversight

Requirements Development
and Management

→ Solicitation

Software Acquisition Plan

Optimizing

Quantitative

Defined

**Level 2:
Repeatable**

Initial



Software Acquisition Planning (SAP)

Purpose: to ensure that reasonable planning is conducted and that all elements are included

Begins as soon as it is determined that software will be a part of a system to be acquired

Includes planning for all the other KPA activities



SAP Goals

Goal 1: Acquisition planning documents are prepared early in the process and prior to contractual actions.

Goal 2: The plans encompass the total software acquisition effort and life cycle support.



SAP Activities -1

The plans, called software acquisition plans, that cover the total acquisition effort are at the heart of this KPA.

Major components of the software acquisition plans include

- **the acquisition strategy**
- **KPA-specific plans**
- **the life cycle support plan**
- **life cycle cost estimates**

The *system* acquisition plans also affect the software acquisition plans.

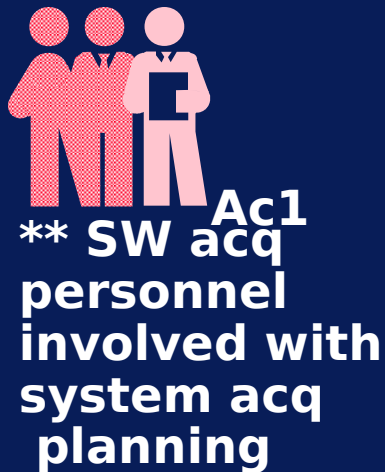


SAP Activities -2

**Ac4: Software acquisition planning
addresses elements of the
software acquisition process.**



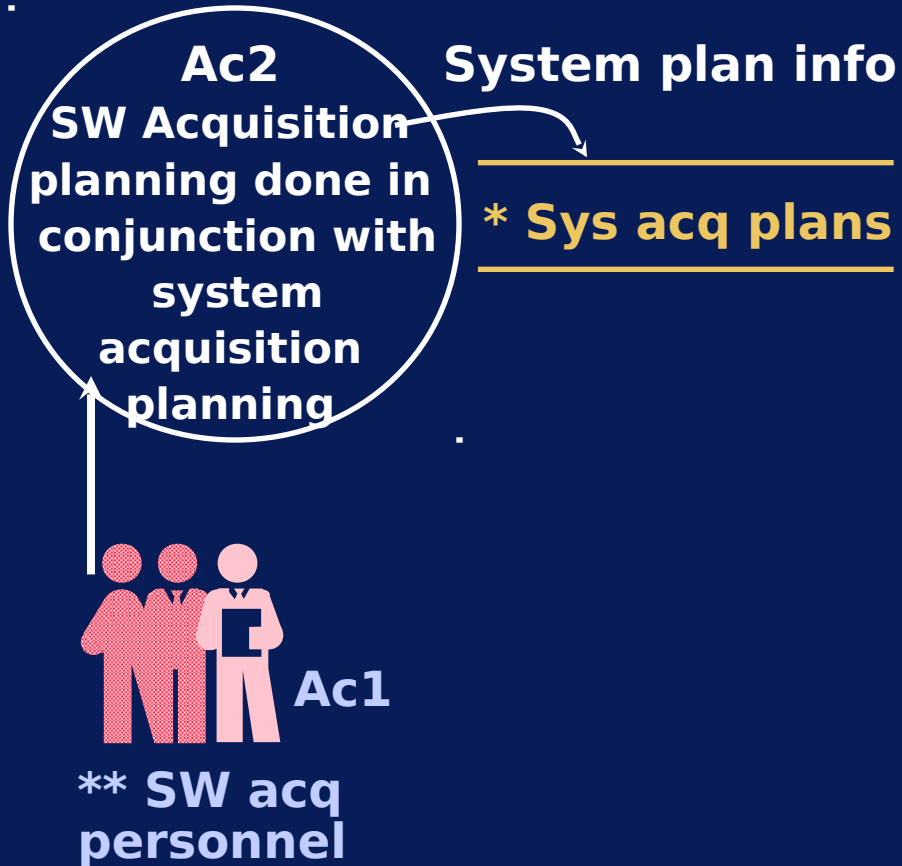
SAP Activities -3



*** Sys acq plans = System acquisition**



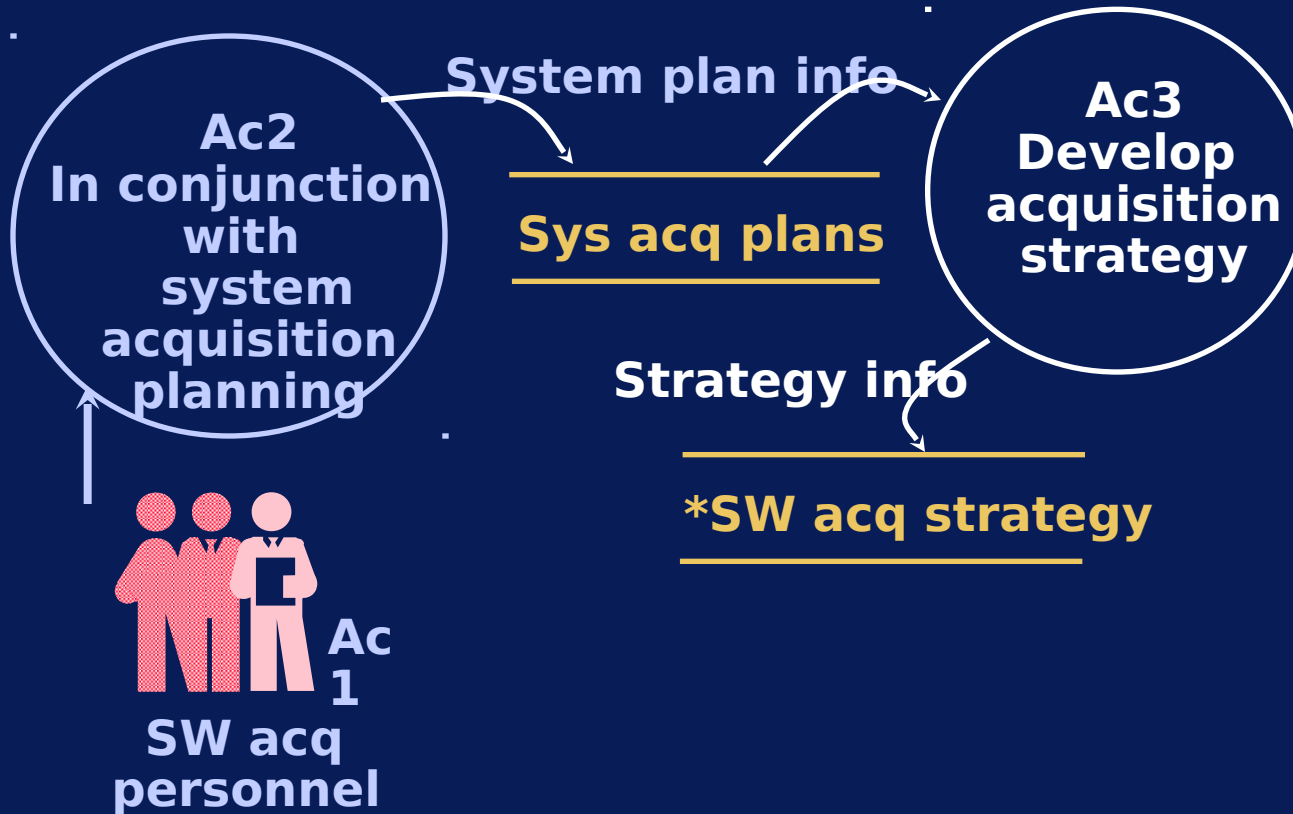
SAP Activities -4



*** Sys acq plans = System acquisition**



SAP Activities - 5



***SW acq strategy = Software acquisition strategy**



SAP Activities - 6

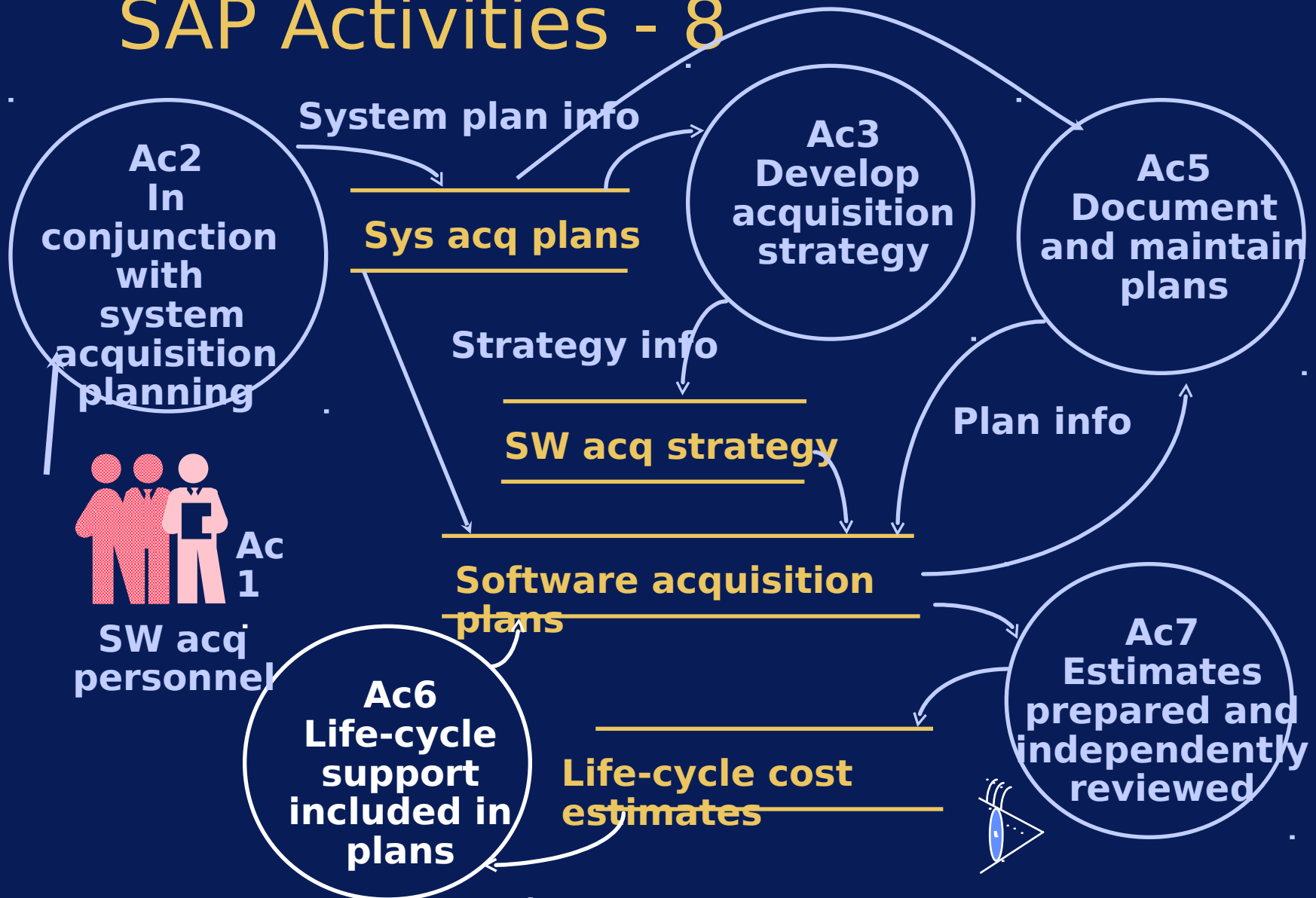


SAP Activities - 7





SAP Activities - 8





SAP Institutionalization Features -1

Commitment 1: The acquisition organization has a written policy for planning the software acquisition.

Commitment 2: Responsibility for software acquisition planning activities is designated.

Ability 1: The acquisition organization has experienced software acquisition management personnel.

Ability 2: Adequate resources are provided for software acquisition.



SAP Institutionalization

Features -2

Measurement 1: Measurements are made and used to determine the status of the software acquisition planning activities and resultant products.

Verification 1: Software acquisition planning activities are reviewed by acquisition organization management on a periodic basis.

Verification 2: Software acquisition planning activities are reviewed by the project manager on both a periodic and event-driven basis.



SAP Summary

Many acquisition problems result from poor planning.

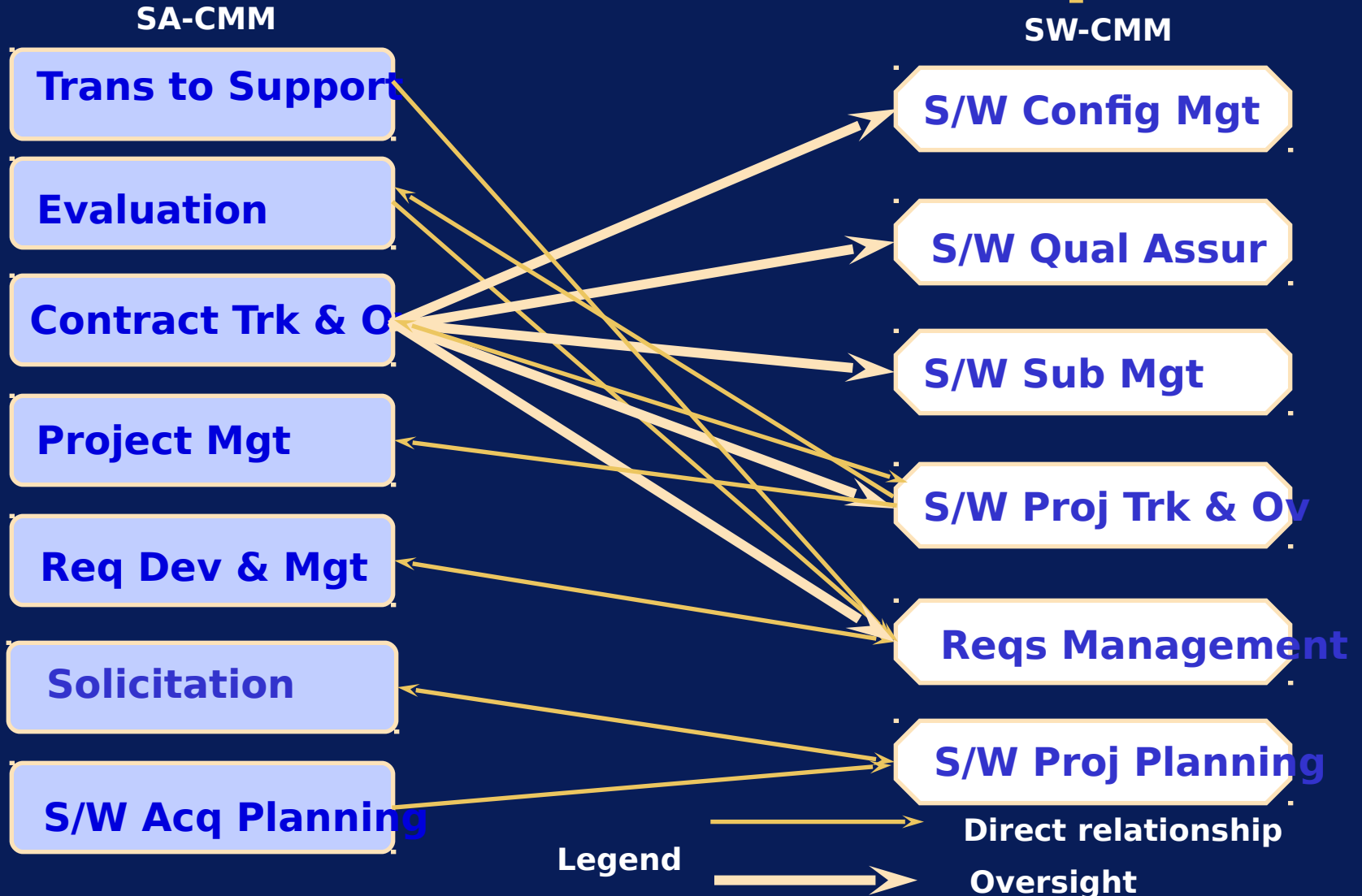
Software acquisition planning

- **is a comprehensive planning effort**
- **starts early in the acquisition process, even before the project team is established.**

Software acquisition planning provides a foundation for all other KPAs in Levels 2 through 5 of the SA-CMM. It is a continuously performed activity.



Level 2 KPA Relationships





Level 3 KPA Relationships

SA-CMM

SW-CMM

Training Program

Training Program

Acq Risk Mgt

Peer Reviews

Contract Perf Mgt

Intergroup Coord

Project Perf Mgt

S/W Product Engr

Proc Defn & Maint

Integ S/W Mgt

Org Process Defn

Org Process Focus

Transition to Spt
Evaluation

--- Comparable

→ Direct relationship

→ Oversight



Level 4-5 KPA Relationships

SA-CMM

SW-CMM

Acq Innovation Mgt

Technology Chg Mgt

Continuous Proc Imp

Process Change Mgt

Quantitative Acq Mgt

Defect Prevention

S/W Quality Mgt

Quantitative Proc Mgt

Quantitative Proc Mgt





SW-CMM to P-CMM Relationships

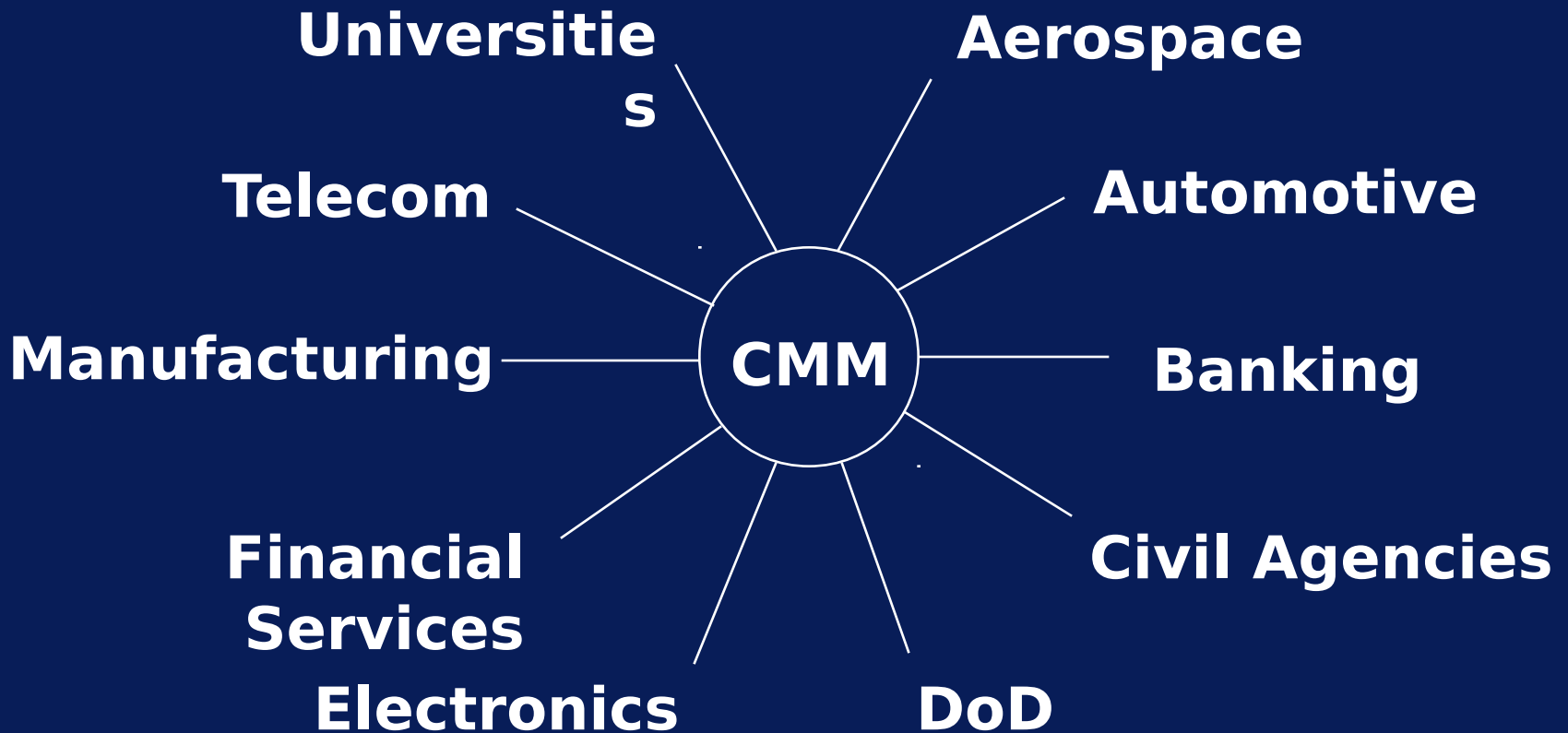
SW-CMM Key Process Areas

P-CMM Key Process Areas





Industries Using CMM





Benefits of Model-Based Improvements

Organization

- **Enhanced business performance**
- **Increased capability to acquire systems**
- **Increased capability to engineer software**
- **Leverage of benefits achieved through improvements in process and technology**
- **Better use of people assets**
- **Increased corporate knowledge and learning**



Benefits of Model-Based Improvements

Team/Unit

- **Integration of talent growth with process improvement**
- **Establishment of an effective culture of acquiring systems**
- **Establishment of an effective culture of software engineering**
- **Alignment of individual, team, unit, and organization**
- **Participative culture**



Benefits of Model-Based Improvements Individual

- **Knowledge & skill development**
- **Career development**
- **Professionalism**
- **Staff retention**
- **Job satisfaction**
- **Team performance**



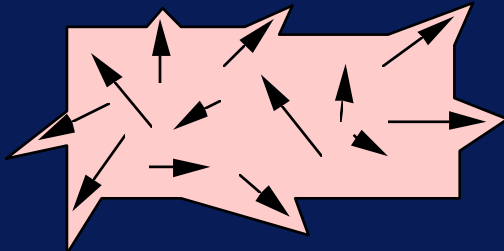
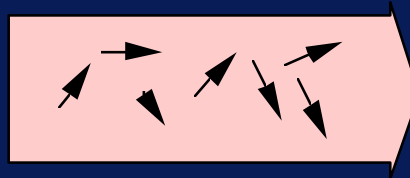
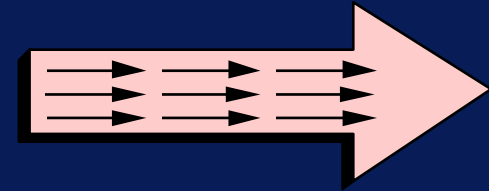
Benefits of Using CMM

- **provide a structured model for improving software acquisition processes and methods.**
- **assessment techniques enable benchmarking and clearly define strengths, weaknesses, and potential improvement areas.**
- **identify candidate practices and supporting technologies, expertise, and infrastructure required to implement, institutionalize and measure the success of a chosen implementation.**



Mature Processes Align the Organization

Alignment is when a group of people function as a whole.



When an organization becomes more aligned, a commonality of direction emerges, and individuals' energies harmonize



What the CMM Does Not Cover

The CMM does not address all process and quality improvement issues.

Issues that are addressed only indirectly, or by implication, include:

- **specific tools, methods, and technologies**
- **concurrent engineering and teamwork**
- **hardware engineering, marketing, etc.**
- **organizational behavior**



What are the DFAS Benefits of Model-Based Improvement? -

1 Establish a common language within DFAS

Forge a shared vision for DFAS improvement

Build on a set of processes and practices developed with input from a broad section of the software community



What are the DFAS Benefits of Model-Based Improvement? -

2 Provide a framework for prioritizing DFAS actions

Provide a framework for performing reliable and consistent appraisals of DFAS improvement

Support DFAS benchmarking with industry-wide comparisons



Buyer/Supplier Mis-match





Summary - 1

CMM's are interrelated.

The SW-CMM has served a major role in the DFAS improvement program.

Build on learning and experience.



Summary - 2

Software is the system.....

***Acquisition is one of the paths to
DFAS Modernization.....***

Is There A Crisis in the DFAS?